How to make believe

Inquisitivity, veridicality, and evidentiality in belief reports

Tom Roberts

August 10, 2021

For slides, visit `tinyurl.com/howtomakebelieve`

Intro to clausal embedding

Predicates which encode mental attitudes or speech acts, such as *believe*, *hope*, and *wonder*, can embed clauses:

Intro to clausal embedding

Predicates which encode mental attitudes or speech acts, such as *believe*, *hope*, and *wonder*, can embed clauses:

(1) a. Kira **believes** that the aliens are prophets.
b. Ben **hopes** that he can protect the wormhole.
c. Jadzia **wonders** whether they will succeed.

Intro to clausal embedding

Predicates which encode mental attitudes or speech acts, such as *believe*, *hope*, and *wonder*, can embed clauses:

(1) a. Kira **believes** that the aliens are prophets.
b. Ben **hopes** that he can protect the wormhole.
c. Jadzia **wonders** whether they will succeed.

Sentences like (1), (minimally) containing of an clausal-embedding (CE) predicate and an embedded clause: **attitude reports**

Distribution of attitude reports

CE predicates also differ in the *types* of clauses they can select (or 'embed').

Distribution of attitude reports

CE predicates also differ in the *types* of clauses they can select (or 'embed').

Some predicates embed only declaratives (2), some embed only interrogatives (3), and some either (4):

Distribution of attitude reports

CE predicates also differ in the *types* of clauses they can select (or 'embed').

Some predicates embed only declaratives (2), some embed only interrogatives (3), and some either (4):

(2) a. The Federation **hopes/thinks** that victory will come.
b. *The Federation **hopes/thinks** when victory will come.

Distribution of attitude reports

CE predicates also differ in the *types* of clauses they can select (or 'embed').

Some predicates embed only declaratives (2), some embed only interrogatives (3), and some either (4):

(2) a. The Federation **hopes/thinks** that victory will come.
b. *The Federation **hopes/thinks** when victory will come.

(3) a. *The Federation **investigated/wondered** that victory will come.
b. The Federation **investigated/wondered** when victory will come.

Distribution of attitude reports

CE predicates also differ in the *types* of clauses they can select (or 'embed').

Some predicates embed only declaratives (2), some embed only interrogatives (3), and some either (4):

(2) a. The Federation **hopes/thinks** that victory will come.
b. *The Federation **hopes/thinks** when victory will come.

(3) a. *The Federation **investigated/wondered** that victory will come.
b. The Federation **investigated/wondered** when victory will come.

(4) a. The Federation **knows/said** that victory will come.
b. The Federation **knows/said** when victory will come.

Types of attitudes

Notational shorthand (courtesy of Lahiri 2002):

	Embeds declaratives	**Embeds interrogatives**
Anti-rogative	✓	✗
Rogative	✗	✓
Responsive	✓	✓

Types of attitudes

Notational shorthand (courtesy of Lahiri 2002):

	Embeds declaratives	**Embeds interrogatives**
Anti-rogative	✓	✗
Rogative	✗	✓
Responsive	✓	✓

A major question: how should we account for this variation in clausal-embedding behavior?

A question of selection

One possible analysis is that CE predicates are simply lexically specified for the kind(s) of clauses they can embed.

A question of selection

One possible analysis is that CE predicates are simply lexically specified for the kind(s) of clauses they can embed.

Standard view: Declarative clauses denote propositions (type st) & interrogative clauses denote questions (type $\langle st, t \rangle$) (Karttunen, 1977, *et seq.*)

A question of selection

One possible analysis is that CE predicates are simply lexically specified for the kind(s) of clauses they can embed.

Standard view: Declarative clauses denote propositions (type st) & interrogative clauses denote questions (type $\langle st, t \rangle$) (Karttunen, 1977, *et seq.*)

The difference between *hope* and *wonder* is accounted for by their different s(emantic)-selectional properties:

A question of selection

One possible analysis is that CE predicates are simply lexically specified for the kind(s) of clauses they can embed.

Standard view: Declarative clauses denote propositions (type st) & interrogative clauses denote questions (type $\langle st, t \rangle$) (Karttunen, 1977, *et seq.*)

The difference between *hope* and *wonder* is accounted for by their different s(emantic)-selectional properties:

(5) a. $[\![hope]\!] = \lambda p_{st} \lambda x_e \lambda w_s . \textbf{hope}(p)(x)(w)$

b. $[\![wonder]\!] = \lambda q_{\langle st,t \rangle} \lambda x_e \lambda w_s . \textbf{wonder}(q)(x)(w)$

A question of selection

One possible analysis is that CE predicates are simply lexically specified for the kind(s) of clauses they can embed.

Standard view: Declarative clauses denote propositions (type st) & interrogative clauses denote questions (type $\langle st, t \rangle$) (Karttunen, 1977, *et seq.*)

The difference between *hope* and *wonder* is accounted for by their different s(emantic)-selectional properties:

(5) a. $[\![hope]\!] = \lambda p_{st} \lambda x_e \lambda w_s . \textbf{hope}(p)(x)(w)$

b. $[\![wonder]\!] = \lambda q_{\langle st,t \rangle} \lambda x_e \lambda w_s . \textbf{wonder}(q)(x)(w)$

$\rightarrow$ Combining a lexical item with something it does not s-select = impossible derivation (Grimshaw, 1979; Pesetsky, 1982, 1991)

Problems for the selectional view

This idea is not sufficient to account for variation in CE predicates for several reasons:

Problems for the selectional view

This idea is not sufficient to account for variation in CE predicates for several reasons:

- CE predicates with similar meanings have similar syntactic properties within/across languages (Bolinger, 1968; Cattell, 1978; Heim, 1992, a.m.o.)

Problems for the selectional view

This idea is not sufficient to account for variation in CE predicates for several reasons:

- CE predicates with similar meanings have similar syntactic properties within/across languages (Bolinger, 1968; Cattell, 1978; Heim, 1992, a.m.o.)
- Responsive predicates like *know* can embed both declaratives and interrogatives (Karttunen, 1977; Groenendijk & Stokhof, 1984; Lahiri, 2002, a.o.)

Problems for the selectional view

This idea is not sufficient to account for variation in CE predicates for several reasons:

- CE predicates with similar meanings have similar syntactic properties within/across languages (Bolinger, 1968; Cattell, 1978; Heim, 1992, a.m.o.)
- Responsive predicates like *know* can embed both declaratives and interrogatives (Karttunen, 1977; Groenendijk & Stokhof, 1984; Lahiri, 2002, a.o.)
- Many CE predicates also embed nominals in addition to clauses (Vendler, 1972; Ginzburg, 1995; King, 2002; Moltmann, 2013; Uegaki, 2016, a.o.)

Problems for the selectional view

This idea is not sufficient to account for variation in CE predicates for several reasons:

- CE predicates with similar meanings have similar syntactic properties within/across languages (Bolinger, 1968; Cattell, 1978; Heim, 1992, a.m.o.)
- Responsive predicates like *know* can embed both declaratives and interrogatives (Karttunen, 1977; Groenendijk & Stokhof, 1984; Lahiri, 2002, a.o.)
- Many CE predicates also embed nominals in addition to clauses (Vendler, 1972; Ginzburg, 1995; King, 2002; Moltmann, 2013; Uegaki, 2016, a.o.)

In other words, s-selection alone does not really tell us the 'why' of variation in CE predicates.

Main claim of the dissertation

Embedded clauses are all typewise identical. Restrictions on the syntax of CE predicates follows not from s-selection, but:

Main claim of the dissertation

Embedded clauses are all typewise identical. Restrictions on the syntax of CE predicates follows not from s-selection, but:

- Certain combinations of predicates/clauses results in systematically trivial meanings and therefore unacceptability

  (Gajewski, 2002; Elliott, 2017; Theiler et al., 2018; Mayr, 2019)

Main claim of the dissertation

Embedded clauses are all typewise identical. Restrictions on the syntax of CE predicates follows not from s-selection, but:

- Certain combinations of predicates/clauses results in systematically trivial meanings and therefore unacceptability

  (Gajewski, 2002; Elliott, 2017; Theiler et al., 2018; Mayr, 2019)

- General semantico-pragmatic restrictions on the interaction between presupposed and at-issue content

Main claim of the dissertation

Embedded clauses are all typewise identical. Restrictions on the syntax of CE predicates follows not from s-selection, but:

- Certain combinations of predicates/clauses results in systematically trivial meanings and therefore unacceptability

  (Gajewski, 2002; Elliott, 2017; Theiler et al., 2018; Mayr, 2019)
- General semantico-pragmatic restrictions on the interaction between presupposed and at-issue content
- The presence or absence of arguments whose only contribution is presuppositional influences how verbs compose with embedded clauses

Evidence

Evidence for these claims comes from close examination of belief predicates in English and Estonian:

Evidence

Evidence for these claims comes from close examination of belief predicates in English and Estonian:

- Responsive predicates whose interpretation radically shifts depending on the type of clause they embed (Estonian *mõtlema*)

Evidence

Evidence for these claims comes from close examination of belief predicates in English and Estonian:

- Responsive predicates whose interpretation radically shifts depending on the type of clause they embed (Estonian *mõtlema*)
- Predicates which embed interrogatives only in the scope of certain linguistic operators (*believe* vs. *can't believe*)

Evidence

Evidence for these claims comes from close examination of belief predicates in English and Estonian:

- Responsive predicates whose interpretation radically shifts depending on the type of clause they embed (Estonian *mõtlema*)
- Predicates which embed interrogatives only in the scope of certain linguistic operators (*believe* vs. *can't believe*)
- Nominal-embedding behavior also tracks semantics of CE predicates closely, and can predict features of their CE use (**today**)

The puzzle of *believe DP*

Nominal-embedding attitudes

Many English CE predicates can also embed content DPs, as opposed to only clauses: (Vendler, 1972; King, 2002; Uegaki, 2016)

Nominal-embedding attitudes

Many English CE predicates can also embed content DPs, as opposed to only clauses: (Vendler, 1972; King, 2002; Uegaki, 2016)

⋆ Content nominals: those which can be modified by *that*-clauses (*the claim*, *the rumor*,...)

Nominal-embedding attitudes

Many English CE predicates can also embed content DPs, as opposed to only clauses: (Vendler, 1972; King, 2002; Uegaki, 2016)

⋆ Content nominals: those which can be modified by *that*-clauses (*the claim*, *the rumor*,...)

(6) a. Lucretia believes/denies/confirmed [that she is Elena Ferrante]$_{CP}$.
b. Lucretia believes/denies/confirmed [the rumor/claim/story/lie]$_{DP}$.

Nominal-embedding attitudes

Some verbs, such as *believe* and *trust* can also take non-content DPs as objects, in which case the DP is roughly interpreted as the 'source' of the attitude: (Djärv, 2019)

Nominal-embedding attitudes

Some verbs, such as *believe* and *trust* can also take non-content DPs as objects, in which case the DP is roughly interpreted as the 'source' of the attitude: (Djärv, 2019)

(7) Lucretia believes the seer/the book/Maude.

Nominal-embedding attitudes

Some verbs, such as *believe* and *trust* can also take non-content DPs as objects, in which case the DP is roughly interpreted as the 'source' of the attitude: (Djärv, 2019)

(7) Lucretia believes the seer/the book/Maude.
≈ Lucretia believes {the seer/the book/Maude}**'s claim**

Content vs. non-content DPs

While a *content-DP* + *CP* sequence can be plausibly analyzed as a single constituent, the same is not true of non-content DPs:

Content vs. non-content DPs

While a *content-DP* + *CP* sequence can be plausibly analyzed as a single constituent, the same is not true of non-content DPs:

(8) a. John believes [the rumor that Mary left]$_{DP}$.

Content vs. non-content DPs

While a *content-DP + CP* sequence can be plausibly analyzed as a single constituent, the same is not true of non-content DPs:

(8) a. John believes [the rumor that Mary left]$_{DP}$.

b. *John believes [Mordecai that Mary left]$_{DP}$.

Content vs. non-content DPs

While a *content-DP + CP* sequence can be plausibly analyzed as a single constituent, the same is not true of non-content DPs:

(8) a. John believes [the rumor that Mary left]$_{DP}$.

b. *John believes [Mordecai that Mary left]$_{DP}$.

But *believe-DP-CP* with a non-content DP are grammatical!

Content vs. non-content DPs

While a *content-DP + CP* sequence can be plausibly analyzed as a single constituent, the same is not true of non-content DPs:

(8) a. John believes [the rumor that Mary left]$_{DP}$.

b. *John believes [Mordecai that Mary left]$_{DP}$.

But *believe-DP-CP* with a non-content DP are grammatical!

(9) John believes [Mordecai]$_{DP}$ [that Mary left]$_{CP}$

The central puzzle

The puzzle: How do we compose *believe* with the embedded clause in (9) when there is an intervening DP?

The central puzzle

The puzzle: How do we compose *believe* with the embedded clause in (9) when there is an intervening DP?

This is a challenge for most theories of clausal embedding, which have clauses saturating internal arguments of CE predicates.

The central puzzle

The puzzle: How do we compose *believe* with the embedded clause in (9) when there is an intervening DP?

This is a challenge for most theories of clausal embedding, which have clauses saturating internal arguments of CE predicates.

For example, a 'standard' Hintikkan (1962, 1969) semantics for *believe* cannot account for an object DP in addition to an embedded clause:

The central puzzle

The puzzle: How do we compose *believe* with the embedded clause in (9) when there is an intervening DP?

This is a challenge for most theories of clausal embedding, which have clauses saturating internal arguments of CE predicates.

For example, a 'standard' Hintikkan (1962, 1969) semantics for *believe* cannot account for an object DP in addition to an embedded clause:

(10) $\quad [\![believe]\!] = \lambda p_{st} \lambda x_e \lambda w_s . \textsc{dox}_x^w \subseteq p$

Why does this problem matter?

This is **not** a lexical idiosyncrasy of *believe*. Verbs which can embed non-content DP + CP sequences form clear semantic classes:

Why does this problem matter?

This is **not** a lexical idiosyncrasy of *believe*. Verbs which can embed non-content DP + CP sequences form clear semantic classes:

(11) a. **Verbs of credence**: *agree (with), cite, corroborate, have confidence (in), take at face value, trust...*

b. **Verbs of discredence**: *contradict, counter, disagree (with), dispute, doubt, question, rebut...*

Why does this problem matter?

This is **not** a lexical idiosyncrasy of *believe*. Verbs which can embed non-content DP + CP sequences form clear semantic classes:

(11) a. **Verbs of credence**: *agree (with), cite, corroborate, have confidence (in), take at face value, trust...*
b. **Verbs of discredence**: *contradict, counter, disagree (with), dispute, doubt, question, rebut...*

What these verbs have in common: expressing evaluation of the validity of a particular body of information.

Why does this problem matter?

This is **not** a lexical idiosyncrasy of *believe*. Verbs which can embed non-content DP + CP sequences form clear semantic classes:

(11) a. **Verbs of credence**: *agree (with), cite, corroborate, have confidence (in), take at face value, trust...*
b. **Verbs of discredence**: *contradict, counter, disagree (with), dispute, doubt, question, rebut...*

What these verbs have in common: expressing evaluation of the validity of a particular body of information.

$\rightarrow$ We want to establish a connection between the semantic features of this class and participation in the *V DP CP* construction.

Why does this problem matter?

This is **not** a lexical idiosyncrasy of *believe*. Verbs which can embed non-content DP + CP sequences form clear semantic classes:

(11) a. **Verbs of credence**: *agree (with), cite, corroborate, have confidence (in), take at face value, trust...*
b. **Verbs of discredence**: *contradict, counter, disagree (with), dispute, doubt, question, rebut...*

What these verbs have in common: expressing evaluation of the validity of a particular body of information.

$\rightarrow$ We want to establish a connection between the semantic features of this class and participation in the *V DP CP* construction.

Focus for today: *believe*

What does *believe DP* mean?

Entailment patterns

In a context where *believe DP CP* is true, so are *believe DP* and *believe CP*, regardless of whether the DP is content-denoting or not.

Entailment patterns

In a context where *believe DP CP* is true, so are *believe DP* and *believe CP*, regardless of whether the DP is content-denoting or not.

(12) John believes the rumor that Mary left.
⊨ John believes that Mary left.
⊨ John believes the rumor.

(Uegaki 2016:626)

Entailment patterns

In a context where *believe DP CP* is true, so are *believe DP* and *believe CP*, regardless of whether the DP is content-denoting or not.

(12) John believes the rumor that Mary left.
⊨ John believes that Mary left.
⊨ John believes the rumor.

(Uegaki 2016:626)

(13) John believes Mordecai that Mary left.
⊨ John believes that Mary left.
⊨ John believes Mordecai.

(Djärv 2019:210)

What can be *believed*

Only non-content DPs which denote conversational agents (like people) and repositories of information (like books) make good objects of *believe*.

What can be *believed*

Only non-content DPs which denote conversational agents (like people) and repositories of information (like books) make good objects of *believe*.

(14) John believes Mary/the book/the cardiologist/#the crime scene/#the bloody glove that Agatha is the murderer.

What can be *believed*

Only non-content DPs which denote conversational agents (like people) and repositories of information (like books) make good objects of *believe*.

(14) John believes Mary/the book/the cardiologist/#the crime scene/#the bloody glove that Agatha is the murderer.

The common bond: object DPs of *believe* must be capable of making *assertions*

The assertive requirement

This becomes especially clear when we see the impossibility of the non-content DP being the ‘source’ of a relevant belief if they did not make a particular speech act:

The assertive requirement

This becomes especially clear when we see the impossibility of the non-content DP being the 'source' of a relevant belief if they did not make a particular speech act:

(15) ***Indirect inference context***: *John knows that whenever Mary leaves a party, Mordecai leaves shortly after, though he would never leave early otherwise. John, who has no knowledge of Mary's whereabouts, is waiting outside a party and sees Mordecai leave.*
#John believes Mordecai that Mary left.

The assertion is the source of the belief

It is not enough for this assertion to exist, but it must also be the *source* of the relevant belief.

The assertion is the source of the belief

It is not enough for this assertion to exist, but it must also be the *source* of the relevant belief.

(16) ***Coincidental assertion context**: Mordecai tells John that Mary left, but John already knew that.*
#John believes Mordecai that Mary left.

The assertion is presupposed

Finally, the assertion required by *believe* with a non-content DP is presupposed to exist, and projects past typical presupposition holes:

The assertion is presupposed

Finally, the assertion required by *believe* with a non-content DP is presupposed to exist, and projects past typical presupposition holes:

(17) a. John doesn't believe Mordecai that Mary left.
b. Does John believe Mordecai that Mary left?
c. If John believes Mordecai that Mary left, then he will have an accurate headcount.
⊨ Mordecai claimed that Mary left.

Summary

Summary

1. *x believe y that p*, where *y* is a non-contentful entity, presupposes that:

Summary

1. *x believe y that p*, where *y* is a non-contentful entity, presupposes that:
   - *y* made the claim that *p*

Summary

1. *x believe y that p*, where *y* is a non-contentful entity, presupposes that:
   - *y* made the claim that *p*
   - *y*'s claiming that *p* would lead *x* to believe that *p*.

Summary

1. *x believe y that p*, where *y* is a non-contentful entity, presupposes that:
   - *y* made the claim that *p*
   - *y*'s claiming that *p* would lead *x* to believe that *p*.
2. *x believe y that p* entails *x believe y* and *x believe p*.

A solution to the puzzle

Preview of the solution

- *Believe* selects for an *evidential source* argument **in addition to** a clausal argument.

Preview of the solution

- *Believe* selects for an *evidential source* argument **in addition to** a clausal argument.
- The source argument can be explicitly saturated by an object DP

Preview of the solution

- *Believe* selects for an *evidential source* argument **in addition to** a clausal argument.
- The source argument can be explicitly saturated by an object DP
- The type of the source argument is that of a contentful entity (type c; $D_c \subset D_e$) (cf. Hacquard 2006, 2010)

Preview of the solution

- *Believe* selects for an *evidential source* argument **in addition to** a clausal argument.
- The source argument can be explicitly saturated by an object DP
- The type of the source argument is that of a contentful entity (type c; $D_c \subset D_e$) (cf. Hacquard 2006, 2010)
- In cases where *believe* does not take a direct object, the source argument is existentially closed

Response-stance verbs

In effect, *believe* will be treated as a weak ‘response-stance verb’.

Response-stance verbs

In effect, *believe* will be treated as a weak ‘response-stance verb’.

These verbs are CE predicates which presuppose a prior assertion of the embedded clause. (Cattell, 1978; Hegarty, 1990; Kastner, 2015)

Response-stance verbs

In effect, *believe* will be treated as a weak 'response-stance verb'.

These verbs are CE predicates which presuppose a prior assertion of the embedded clause. (Cattell, 1978; Hegarty, 1990; Kastner, 2015)

(18) We **denied/agreed/confirmed/verified** that the cookies were ready.

Response-stance verbs

In effect, *believe* will be treated as a weak 'response-stance verb'.

These verbs are CE predicates which presuppose a prior assertion of the embedded clause. (Cattell, 1978; Hegarty, 1990; Kastner, 2015)

(18) We **denied/agreed/confirmed/verified** that the cookies were ready.
Presupposed: Someone claimed that the cookies were ready.

Response-stance verbs

In effect, *believe* will be treated as a weak 'response-stance verb'.

These verbs are CE predicates which presuppose a prior assertion of the embedded clause. (Cattell, 1978; Hegarty, 1990; Kastner, 2015)

(18) We **denied/agreed/confirmed/verified** that the cookies were ready.
Presupposed: Someone claimed that the cookies were ready.

Believe differs from other such verbs in does not *always* presuppose such an assertion, but only when it takes a DP object.

Breaking down belief

A sentence of the form *x believe y that p* has the following meaning:

Breaking down belief

A sentence of the form *x believe y that p* has the following meaning:

At-issue: *x*'s doxastic state (the set of worlds compatible with their beliefs) entails *p*

Breaking down belief

A sentence of the form *x believe y that p* has the following meaning:

At-issue: *x*'s doxastic state (the set of worlds compatible with their beliefs) entails *p*

Presupposed:

Breaking down belief

A sentence of the form *x believe y that p* has the following meaning:

At-issue: *x*'s doxastic state (the set of worlds compatible with their beliefs) entails *p*

Presupposed:

- *y* refers to (at some level) an assertion

Breaking down belief

A sentence of the form *x believe y that p* has the following meaning:

At-issue: *x*'s doxastic state (the set of worlds compatible with their beliefs) entails *p*

Presupposed:

- *y* refers to (at some level) an assertion
- The content of *y* entails *p*

Breaking down belief

A sentence of the form *x believe y that p* has the following meaning:

At-issue: *x*'s doxastic state (the set of worlds compatible with their beliefs) entails *p*

Presupposed:

- *y* refers to (at some level) an assertion
- The content of *y* entails *p*
- *x* is acquainted with (aware of) *y*

Breaking down belief

A sentence of the form *x believe y that p* has the following meaning:

At-issue: *x*'s doxastic state (the set of worlds compatible with their beliefs) entails *p*

Presupposed:

- *y* refers to (at some level) an assertion
- The content of *y* entails *p*
- *x* is acquainted with (aware of) *y*
- *x* would not believe *p* if not for their acquaintance with *y*

Formalization

Assumption: declarative & interrogative clauses both denote downward-closed sets of sets of worlds ($\langle st, t \rangle$), as in Inquisitive Semantics (Ciardelli et al., 2013; Theiler et al., 2018)

Formalization

Assumption: declarative & interrogative clauses both denote downward-closed sets of sets of worlds ($\langle st, t\rangle$), as in Inquisitive Semantics (Ciardelli et al., 2013; Theiler et al., 2018)

(19) $[\![\text{believe}]\!]^w = \lambda y_c.\lambda p_{\langle st,t\rangle}.\lambda x_e.\textsc{dox}_x^w \in p$

Formalization

Assumption: declarative & interrogative clauses both denote downward-closed sets of sets of worlds ($\langle st, t\rangle$), as in Inquisitive Semantics (Ciardelli et al., 2013; Theiler et al., 2018)

(19) $[\![\text{believe}]\!]^w = \lambda y_c.\lambda p_{\langle st,t\rangle}.\lambda x_e.\textsc{dox}_x^w \in p$

$$\begin{cases} \text{defined if 1) } \textsc{con}(y) \in p \\ \\ \\ \\ \end{cases}$$

Formalization

Assumption: declarative & interrogative clauses both denote downward-closed sets of sets of worlds ($\langle st, t\rangle$), as in Inquisitive Semantics (Ciardelli et al., 2013; Theiler et al., 2018)

(19) $[\![\text{believe}]\!]^w = \lambda y_c.\lambda p_{\langle st,t\rangle}.\lambda x_e.\textsc{dox}_x^w \in p$

$$\begin{cases} \text{defined if } 1)\ \textsc{con}(y) \in p \\ \qquad\qquad\ 2)\ \textsc{acq}(x)(y)(w) \end{cases}$$

Formalization

Assumption: declarative & interrogative clauses both denote downward-closed sets of sets of worlds ($\langle st, t\rangle$), as in Inquisitive Semantics (Ciardelli et al., 2013; Theiler et al., 2018)

(19) $[\![\text{believe}]\!]^w = \lambda y_c.\lambda p_{\langle st,t\rangle}.\lambda x_e.\textsc{dox}_x^w \in p$

$$\begin{cases} \text{defined if } 1)\ \textsc{con}(y) \in p \\ \qquad\qquad\ 2)\ \textsc{acq}(x)(y)(w) \\ \qquad\qquad\ 3)\ \forall w'[w' \in max_{\leq,w}(\neg\textsc{acq}(x)(y))][(\neg\textsc{dox}_x^{w'} \in p)] \end{cases}$$

Formalization

Assumption: declarative & interrogative clauses both denote downward-closed sets of sets of worlds ($\langle st, t\rangle$), as in Inquisitive Semantics (Ciardelli et al., 2013; Theiler et al., 2018)

(19) $[\![\text{believe}]\!]^w = \lambda y_c.\lambda p_{\langle st,t\rangle}.\lambda x_e.\textsc{dox}_x^w \in p$

$$\left\{\begin{array}{l} \text{defined if } 1)\ \textsc{con}(y) \in p \\ \qquad\qquad\quad 2)\ \textsc{acq}(x)(y)(w) \\ \qquad\qquad\quad 3)\ \forall w'[w' \in max_{\leq,w}(\neg\textsc{acq}(x)(y))][(\neg\textsc{dox}_x^{w'} \in p)] \\ \#\ \text{otherwise} \end{array}\right\}$$

Formalization

Assumption: declarative & interrogative clauses both denote downward-closed sets of sets of worlds ($\langle st, t\rangle$), as in Inquisitive Semantics (Ciardelli et al., 2013; Theiler et al., 2018)

(19) $[\![\text{believe}]\!]^w = \lambda y_c.\lambda p_{\langle st,t\rangle}.\lambda x_e.\textsc{dox}_x^w \in p$

$$\left\{\begin{array}{l} \text{defined if } 1)\ \textsc{con}(y) \in p \\ \qquad\qquad\quad 2)\ \textsc{acq}(x)(y)(w) \\ \qquad\qquad\quad 3)\ \forall w'[w' \in max_{\leq,w}(\neg\textsc{acq}(x)(y))][(\neg\textsc{dox}_x^{w'} \in p)] \\ \#\ \text{otherwise} \end{array}\right\}$$

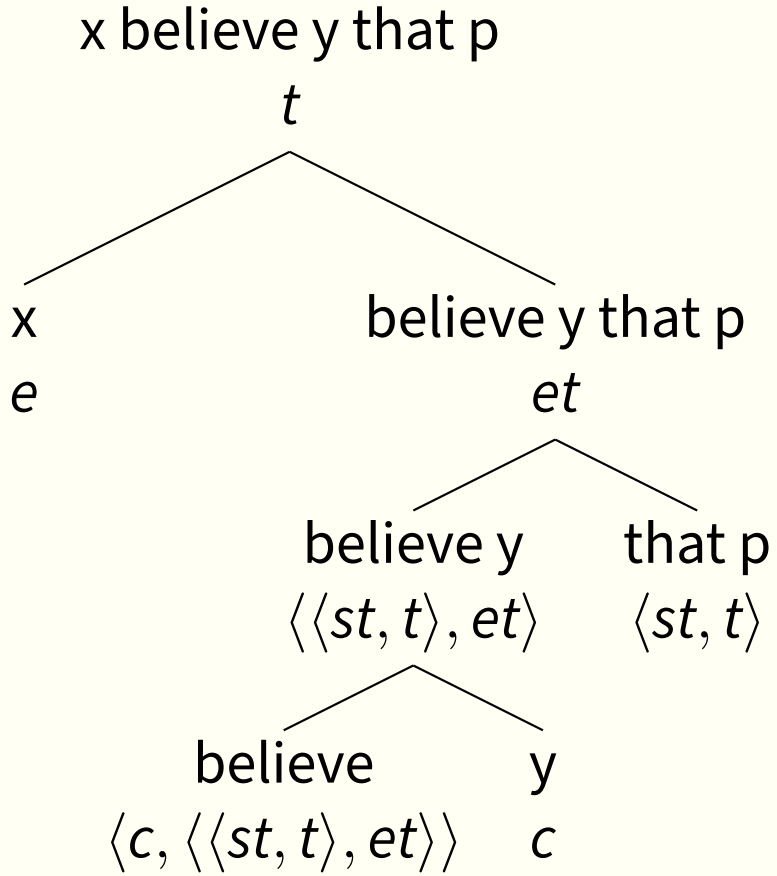
The third component is a Lewisian counterfactual, where:

(20) a. For worlds w', w'', $w' \leq_w w''$ iff w' is more similar to w than w'' is to w.

b. $max_{\leq,w}(p) = \{w' : p(w') = 1 \wedge \forall w''[p(w'') = 1][w' \leq_w w'']\}$

(von Fintel 2001:126)

LF


x believe y that p
t
x
e
believe y that p
et
believe y
$\langle\langle st, t\rangle, et\rangle$
that p
$\langle st, t\rangle$
believe
$\langle c, \langle\langle st, t\rangle, et\rangle\rangle$
y
c

Restrictions on object DPs

Believe selects for a contentful entity, here defined as an entity which can be identified with a singular propositional content.

Restrictions on object DPs

Believe selects for a contentful entity, here defined as an entity which can be identified with a singular propositional content.

This entity is the ‘source’ of the relevant belief.

Restrictions on object DPs

Believe selects for a contentful entity, here defined as an entity which can be identified with a singular propositional content.

This entity is the 'source' of the relevant belief.

I assume that content DPs (*the rumor*, *the idea*...) denote contentful entities inherently.

Composing with non-content DPs

Non-content DPs capable of making assertions (*John*) are possible objects of *believe*, but are the wrong type (*e* as opposed to *c*).

Composing with non-content DPs

Non-content DPs capable of making assertions (*John*) are possible objects of *believe*, but are the wrong type (*e* as opposed to *c*).

Solution: An *e*-type entity *x* can be coerced into a *c*-type entity corresponding roughly to '*x*'s claim', due to a compositional rule:

Composing with non-content DPs

Non-content DPs capable of making assertions (*John*) are possible objects of *believe*, but are the wrong type (*e* as opposed to *c*).

Solution: An *e*-type entity *x* can be coerced into a *c*-type entity corresponding roughly to '*x*'s claim', due to a compositional rule:

(21) **FA with contentful entity coercion**
For α of type *e* and β of type $c \rightarrow \tau$ (where τ is any type),
$\beta(\alpha) = \beta(\textsc{claim}(\alpha))$ (cf. Pustejovsky 1995)

Composing with non-content DPs

Non-content DPs capable of making assertions (*John*) are possible objects of *believe*, but are the wrong type (*e* as opposed to *c*).

Solution: An *e*-type entity *x* can be coerced into a *c*-type entity corresponding roughly to '*x*'s claim', due to a compositional rule:

(21) **FA with contentful entity coercion**
For α of type *e* and β of type $c \to \tau$ (where τ is any type), $\beta(\alpha) = \beta(\textsc{claim}(\alpha))$ (cf. Pustejovsky 1995)

(22) $[\![\textsc{claim}]\!]^w = \lambda x_e . \iota y_c [\textbf{claim}(y)(w) \wedge \textsc{auth}(y)(w) = x]$

Composition with a DP and a CP

(23) Mary believes Janet that the cookies are ready.

Composition with a DP and a CP

(23) Mary believes Janet that the cookies are ready.

The non-content DP *Janet* must be coerced into a *c*-type object referring to her specific claim.

Composition with a DP and a CP

(23) Mary believes Janet that the cookies are ready.

The non-content DP *Janet* must be coerced into a c-type object referring to her specific claim.

(24) $\textbf{jclaim} := \iota y_c[\textbf{claim}(y)(w) \wedge \textsc{auth}(y)(w) = j]$
$\approx$ 'the claim that Janet made in w'

Composition with a DP and a CP

(23) Mary believes Janet that the cookies are ready.

The non-content DP *Janet* must be coerced into a *c*-type object referring to her specific claim.

(24) $\textbf{jclaim} := \iota y_c[\textbf{claim}(y)(w) \wedge \textsc{auth}(y)(w) = j]$
$\approx$ 'the claim that Janet made in w'

(25) $[\![(23)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{ cookies ready in } w'\}^{\downarrow}$
$\begin{cases} \text{defined if 1) } \textsc{con}(\textbf{jclaim}) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \\ \\ \\ \\ \end{cases}$

Composition with a DP and a CP

(23) Mary believes Janet that the cookies are ready.

The non-content DP *Janet* must be coerced into a *c*-type object referring to her specific claim.

(24) $\textbf{jclaim} := \iota y_c[\textbf{claim}(y)(w) \wedge \textsc{auth}(y)(w) = j]$
$\approx$ 'the claim that Janet made in w'

(25) $[\![(23)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{ cookies ready in } w'\}^{\downarrow}$

$$\begin{cases} \text{defined if 1) } \textsc{con}(\textbf{jclaim}) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \qquad\qquad\quad 2) \textsc{acq}(\text{m})(\textbf{jclaim})(\text{w}) \end{cases}$$

Composition with a DP and a CP

(23) Mary believes Janet that the cookies are ready.

The non-content DP *Janet* must be coerced into a *c*-type object referring to her specific claim.

(24) $\textbf{jclaim} := \iota y_c[\textbf{claim}(y)(w) \wedge \textsc{auth}(y)(w) = j]$
$\approx$ 'the claim that Janet made in w'

(25) $[\![(23)]\!]^w = \textsc{dox}_m^w \in \{w' : \text{ cookies ready in } w'\}^{\downarrow}$

$$\begin{cases} \text{defined if } 1)\ \textsc{con}(\textbf{jclaim}) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \qquad\qquad 2)\ \textsc{acq}(\text{m})(\textbf{jclaim})(\text{w}) \\ \qquad\qquad 3)\ \forall w'[w' \in max_{\leq,w}(\neg\textsc{acq}(m)(\textbf{jclaim})(w)) \\ \qquad\qquad [(\neg\textsc{dox}_m^{w'} \in \{w'' : \text{cookies ready in } w''\}^{\downarrow})] \end{cases}$$

Composition with a DP and a CP

(23) Mary believes Janet that the cookies are ready.

The non-content DP *Janet* must be coerced into a *c*-type object referring to her specific claim.

(24) $\textbf{jclaim} := \iota y_c[\textbf{claim}(y)(w) \wedge \textsc{auth}(y)(w) = j]$
$\approx$ 'the claim that Janet made in w'

(25) $[\![(23)]\!]^w = \textsc{dox}_m^w \in \{w' : \text{ cookies ready in } w'\}^{\downarrow}$

$$\left\{ \begin{array}{l} \text{defined if } 1)\ \textsc{con}(\textbf{jclaim}) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \qquad\qquad\quad 2)\ \textsc{acq}(\text{m})(\textbf{jclaim})(\text{w}) \\ \qquad\qquad\quad 3)\ \forall w'[w' \in max_{\leq,w}(\neg\textsc{acq}(m)(\textbf{jclaim})(w)) \\ \qquad\qquad\quad [(\neg\textsc{dox}_m^{w'} \in \{w'' : \text{cookies ready in } w''\}^{\downarrow})] \\ \# \text{ otherwise} \end{array} \right\}$$

Composition without a DP

(26) Mary believes that the cookies are ready.

Composition without a DP

(26) Mary believes that the cookies are ready.

Believe cannot directly compose with the embedded clause without a type mismatch; the content argument is in the way.

Composition without a DP

(26) Mary believes that the cookies are ready.

Believe cannot directly compose with the embedded clause without a type mismatch; the content argument is in the way.

Proposal: This argument of *believe* can be interpreted existentially, analogous to internal arguments of verbs like *eat* (e.g. Williams 2015)

Composition without a DP

(26) Mary believes that the cookies are ready.

Believe cannot directly compose with the embedded clause without a type mismatch; the content argument is in the way.

Proposal: This argument of *believe* can be interpreted existentially, analogous to internal arguments of verbs like *eat* (e.g. Williams 2015)

(27) $[\![\text{Mary ate}]\!] = \exists x[\textbf{eat}(m)(x)]$

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

(28) Mary believes that the cookies are ready.

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

(28) Mary believes that the cookies are ready.

(29) $[\![(28)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{cookies ready in } w'\}^{\downarrow}$

$\left\{ \begin{array}{l} \text{defined if } \exists y \text{ s.t.} \end{array} \right.$

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

(28) Mary believes that the cookies are ready.

(29) $[\![(28)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{cookies ready in } w'\}^{\downarrow}$

$$\begin{cases} \text{defined if } \exists y \text{ s.t. } 1)\textsc{con}(y) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \\ \\ \\ \\ \end{cases}$$

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

(28) Mary believes that the cookies are ready.

(29) $[\![(28)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{cookies ready in } w'\}^{\downarrow}$

$$\begin{cases} \text{defined if } \exists y \text{ s.t. } 1) \textsc{con}(y) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \qquad\qquad\qquad\qquad\quad 2) \textsc{acq}(\text{m})(\text{y})(\text{w}) \end{cases}$$

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

(28) Mary believes that the cookies are ready.

(29) $[\![(28)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{cookies ready in } w'\}^{\downarrow}$

$$\begin{cases} \text{defined if } \exists y \text{ s.t. } 1)\textsc{con}(y) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \qquad\qquad\qquad\qquad\quad 2)\ \textsc{acq}(\text{m})(\text{y})(\text{w}) \\ \qquad\qquad\qquad\qquad\quad 3)\ \forall w'[w' \in max_{\leq,w}(\neg\textsc{acq}(m)(y)(w)) \\ \qquad\qquad\qquad\qquad\quad [(\neg\textsc{dox}^{w'}_m \in \{w'' : \text{cookies ready in } w''\}^{\downarrow})] \end{cases}$$

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

(28) Mary believes that the cookies are ready.

(29) $[\![(28)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{cookies ready in } w'\}^{\downarrow}$

$$\left\{ \begin{array}{l} \text{defined if } \exists y \text{ s.t. } 1) \textsc{con}(y) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \qquad\qquad\qquad\qquad\quad 2) \textsc{acq}(\text{m})(\text{y})(\text{w}) \\ \qquad\qquad\qquad\qquad\quad 3) \forall w' [w' \in max_{\leq,w}(\neg \textsc{acq}(m)(y)(w)) \\ \qquad\qquad\qquad\qquad\quad [(\neg \textsc{dox}^{w'}_m \in \{w'' : \text{cookies ready in } w''\}^{\downarrow})] \\ \text{\# otherwise} \end{array} \right\}$$

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

(28) Mary believes that the cookies are ready.

(29) $[\![(28)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{cookies ready in } w'\}^{\downarrow}$

$$\left\{ \begin{array}{l} \text{defined if } \exists y \text{ s.t. } 1) \textsc{con}(y) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \qquad\qquad\qquad\qquad\quad 2) \textsc{acq}(m)(y)(w) \\ \qquad\qquad\qquad\qquad\quad 3) \forall w' [w' \in max_{\leq,w}(\neg \textsc{acq}(m)(y)(w)) \\ \qquad\qquad\qquad\qquad\quad [(\neg \textsc{dox}^{w'}_m \in \{w'' : \text{cookies ready in } w''\}^{\downarrow})] \\ \text{\# otherwise} \end{array} \right\}$$

The presupposition that 'there is some particular evidence for Mary's belief that *p*' is *very* weak given that Mary believes *p*.

Presupposition accommodation

Formally, this can be achieved many ways, e.g. existentially closing the content argument of *believe*.

(28) Mary believes that the cookies are ready.

(29) $[\![(28)]\!]^w = \textsc{dox}^w_m \in \{w' : \text{cookies ready in } w'\}^{\downarrow}$

$$\left\{ \begin{array}{l} \text{defined if } \exists y \text{ s.t. } 1) \textsc{con}(y) \in \{w' : \text{cookies ready in } w'\}^{\downarrow} \\ \qquad\qquad\qquad\qquad\quad 2) \textsc{acq}(m)(y)(w) \\ \qquad\qquad\qquad\qquad\quad 3) \forall w' [w' \in max_{\leq,w}(\neg \textsc{acq}(m)(y)(w)) \\ \qquad\qquad\qquad\qquad\quad [(\neg \textsc{dox}^{w'}_m \in \{w'' : \text{cookies ready in } w''\}^{\downarrow})] \\ \text{\# otherwise} \end{array} \right\}$$

The presupposition that 'there is some particular evidence for Mary's belief that *p*' is *very* weak given that Mary believes *p*.

→ People don't tend to form beliefs out of thin air, so this presupposition is easily accommodated.

Composition without a CP

Believe can also occur without a clausal complement:

(30) Mary believes Janet.

Composition without a CP

Believe can also occur without a clausal complement:

(30) Mary believes Janet.

The embedded clause is obligatorily interpreted as pragmatically recoverable, similar to DOs of *win* and *watch*.

Composition without a CP

Believe can also occur without a clausal complement:

(30) Mary believes Janet.

The embedded clause is obligatorily interpreted as pragmatically recoverable, similar to DOs of *win* and *watch*.

(31) ⟦ Lucy won ⟧
≈ Lucy won *some particular salient competition*

Composition without a CP

Believe can also occur without a clausal complement:

(30) Mary believes Janet.

The embedded clause is obligatorily interpreted as pragmatically recoverable, similar to DOs of *win* and *watch*.

(31) ⟦ Lucy won ⟧
≈ Lucy won *some particular salient competition*

If a similar mechanism is at play in (30), the propositional argument of *believe* refers to a salient proposition in the discourse context.

Composition with no internal argument

I have proposed that both the source argument and the clausal argument are both optional:

Composition with no internal argument

I have proposed that both the source argument and the clausal argument are both optional:

- **Source Argument**: Can be interpreted existentially

Composition with no internal argument

I have proposed that both the source argument and the clausal argument are both optional:

- **Source Argument**: Can be interpreted existentially
- **Clausal Argument**: Can be implicit iff pragmatically recoverable

Composition with no internal argument

I have proposed that both the source argument and the clausal argument are both optional:

- **Source Argument**: Can be interpreted existentially
- **Clausal Argument**: Can be implicit iff pragmatically recoverable

However, *believe* cannot occur without at least one of these arguments expressed overtly:

(32) *Mary believes.

Composition with no internal argument

I have proposed that both the source argument and the clausal argument are both optional:

- **Source Argument**: Can be interpreted existentially
- **Clausal Argument**: Can be implicit iff pragmatically recoverable

However, *believe* cannot occur without at least one of these arguments expressed overtly:

(32) *Mary believes.

This remains an open question under the present account.

Welcome consequences

Predicates of Personal Taste

Predicates of personal taste (PPTs): descriptions like *tasty*, *good*, etc., that require a 'judge' to be interpreted

Predicates of Personal Taste

Predicates of personal taste (PPTs): descriptions like *tasty*, *good*, etc., that require a 'judge' to be interpreted

PPTs under *believe* give rise to the anomalous interpretation that the attitude holder (subject) is not the judge:

Predicates of Personal Taste

Predicates of personal taste (PPTs): descriptions like *tasty*, *good*, etc., that require a 'judge' to be interpreted

PPTs under *believe* give rise to the anomalous interpretation that the attitude holder (subject) is not the judge:

(33) *Context: **A**listair, **B**elinda, and **C**andace are at a potluck. **A** and **B** brought a cake, and surreptitiously watch from across the room as **C** tries it. **C**'s face lights up. Relieved, **A** says:*

Predicates of Personal Taste

Predicates of personal taste (PPTs): descriptions like *tasty*, *good*, etc., that require a 'judge' to be interpreted

PPTs under *believe* give rise to the anomalous interpretation that the attitude holder (subject) is not the judge:

(33) *Context: **A**listair, **B**elinda, and **C**andace are at a potluck. **A** and **B** brought a cake, and surreptitiously watch from across the room as **C** tries it. **C**'s face lights up. Relieved, **A** says:*

a. Candace thinks that the cake is tasty!

Predicates of Personal Taste

Predicates of personal taste (PPTs): descriptions like *tasty*, *good*, etc., that require a 'judge' to be interpreted

PPTs under *believe* give rise to the anomalous interpretation that the attitude holder (subject) is not the judge:

(33) *Context: **A**listair, **B**elinda, and **C**andace are at a potluck. **A** and **B** brought a cake, and surreptitiously watch from across the room as **C** tries it. **C**'s face lights up. Relieved, **A** says:*

a. Candace thinks that the cake is tasty!

b. #Candace believes that the cake is tasty!

(adapted from Stephenson 2007:63)

Predicates of Personal Taste

This points to a restriction on the content argument of *believe* s.t. it cannot be the attitude holder's sensory experience.

Predicates of Personal Taste

This points to a restriction on the content argument of *believe* s.t. it cannot be the attitude holder's sensory experience.

If the judge of tastiness *is* someone besides the attitude holder, they can indeed correspond to a direct object DP:

Predicates of Personal Taste

This points to a restriction on the content argument of *believe* s.t. it cannot be the attitude holder's sensory experience.

If the judge of tastiness *is* someone besides the attitude holder, they can indeed correspond to a direct object DP:

(34) *Context: **D**ante eats the cake before Candace and tells her that it's delicious. **D** has a refined palate so **C** takes his word for it.*
Candace believes Dante that the cake is tasty.

Accepting assertions

The evidential presupposition of *believe* can also explain contrasts in its pragmatic use with *think*.

Accepting assertions

The evidential presupposition of *believe* can also explain contrasts in its pragmatic use with *think*.

For example, a speaker can use an utterance of *I believe that* to accept a preceding assertion at face value, but not *I think that*:

Accepting assertions

The evidential presupposition of *believe* can also explain contrasts in its pragmatic use with *think*.

For example, a speaker can use an utterance of *I believe that* to accept a preceding assertion at face value, but not *I think that*:

(35) *Context: Kelsey is unfamiliar with Caucasian writing systems. Steven is an expert.*
S: Fun fact! Laz uses the Georgian alphabet.

Accepting assertions

The evidential presupposition of *believe* can also explain contrasts in its pragmatic use with *think*.

For example, a speaker can use an utterance of *I believe that* to accept a preceding assertion at face value, but not *I think that*:

(35) *Context: Kelsey is unfamiliar with Caucasian writing systems. Steven is an expert.*
S: Fun fact! Laz uses the Georgian alphabet.
K: I believe that.

Accepting assertions

The evidential presupposition of *believe* can also explain contrasts in its pragmatic use with *think*.

For example, a speaker can use an utterance of *I believe that* to accept a preceding assertion at face value, but not *I think that*:

(35) *Context: Kelsey is unfamiliar with Caucasian writing systems. Steven is an expert.*
S: Fun fact! Laz uses the Georgian alphabet.
K: I believe that.
K': #I think that.

Accepting assertions

The evidential presupposition of *believe* can also explain contrasts in its pragmatic use with *think*.

For example, a speaker can use an utterance of *I believe that* to accept a preceding assertion at face value, but not *I think that*:

(35) *Context: Kelsey is unfamiliar with Caucasian writing systems. Steven is an expert.*
S: Fun fact! Laz uses the Georgian alphabet.
K: I believe that.
K': #I think that.

I think that gives the impression Kelsey already knew Laz uses the Georgian alphabet. Why?

Accepting assertions

This can be explained with a pragmatic constraint like Maximize Presupposition, which requires speakers to use presuppositional alternatives, all else being equal. (Heim, 1994)

Accepting assertions

This can be explained with a pragmatic constraint like Maximize Presupposition, which requires speakers to use presuppositional alternatives, all else being equal. (Heim, 1994)

Assumption 1: *I believe that* and *I think that* both communicate the at-issue meaning that *I believe that Laz uses the Georgian alphabet.*

Accepting assertions

This can be explained with a pragmatic constraint like Maximize Presupposition, which requires speakers to use presuppositional alternatives, all else being equal. (Heim, 1994)

Assumption 1: *I believe that* and *I think that* both communicate the at-issue meaning that *I believe that Laz uses the Georgian alphabet.*

Assumption 2: *Think* does not have an evidential presupposition

Accepting assertions

This can be explained with a pragmatic constraint like Maximize Presupposition, which requires speakers to use presuppositional alternatives, all else being equal. (Heim, 1994)

Assumption 1: *I believe that* and *I think that* both communicate the at-issue meaning that *I believe that Laz uses the Georgian alphabet.*

Assumption 2: *Think* does not have an evidential presupposition

If Kelsey does in fact believe *p* ***on the basis of Steven's claim***, she must indicate as such by use of *believe* instead of *think*.

A point of skepticism

Declarations of religious belief do not seem like they necessarily require evidence:

A point of skepticism

Declarations of religious belief do not seem like they necessarily require evidence:

(36) a. I believe that all men are created equal.
b. Deep down, she believes that God will save her.

A point of skepticism

Declarations of religious belief do not seem like they necessarily require evidence:

(36) a. I believe that all men are created equal.
b. Deep down, she believes that God will save her.

This might seem to be at odds with the idea that *believe* lexically encodes an evidential presupposition.

A point of skepticism

Declarations of religious belief do not seem like they necessarily require evidence:

(36) a. I believe that all men are created equal.
b. Deep down, she believes that God will save her.

This might seem to be at odds with the idea that *believe* lexically encodes an evidential presupposition.

I propose that examples like (36) **really do** involve evidence-based beliefs, but the definition of 'evidence' which *believe* requires is extraordinarily permissive.

The nature of evidence

Use of a first person subject with *believe* is degraded if the speaker is unaware of the source of that belief.

The nature of evidence

Use of a first person subject with *believe* is degraded if the speaker is unaware of the source of that belief.

(37) a. ?I believe that it's raining but I don't know why I believe that it's raining.

The nature of evidence

Use of a first person subject with *believe* is degraded if the speaker is unaware of the source of that belief.

(37) a. ?I believe that it's raining but I don't know why I believe that it's raining.

b. I think that it's raining but I don't know why I think that it's raining.

The nature of evidence

Use of a first person subject with *believe* is degraded if the speaker is unaware of the source of that belief.

(37) a. ?I believe that it's raining but I don't know why I believe that it's raining.

b. I think that it's raining but I don't know why I think that it's raining.

(38) a. #I believe that it's raining but I don't have any reason for believing that.

b. I think that it's raining but I don't have any reason for thinking that.

The nature of evidence

Use of a first person subject with *believe* is degraded if the speaker is unaware of the source of that belief.

(37) a. ?I believe that it's raining but I don't know why I believe that it's raining.

b. I think that it's raining but I don't know why I think that it's raining.

(38) a. #I believe that it's raining but I don't have any reason for believing that.

b. I think that it's raining but I don't have any reason for thinking that.

An alternative approach

Where is the evidential presupposition?

An alternative solution to derive *believe DP*: introduce non-content DPs with a functional head, like an applicative (Djärv, 2019, 2021)

Where is the evidential presupposition?

An alternative solution to derive *believe DP*: introduce non-content DPs with a functional head, like an applicative (Djärv, 2019, 2021)

Under this view, no need to explain why *believe DP* is presuppositional in a way that *believe* on its own does not seem to be.

Where is the evidential presupposition?

An alternative solution to derive *believe DP*: introduce non-content DPs with a functional head, like an applicative (Djärv, 2019, 2021)

Under this view, no need to explain why *believe DP* is presuppositional in a way that *believe* on its own does not seem to be.

The propositional argument of *believe* can either be saturated by an embedded clause or a content DP (cf. Uegaki 2016)

Evidence from German

In German, non-content DPs under *believe* receive dative case, but content DPs receive accusative:

Evidence from German

In German, non-content DPs under *believe* receive dative case, but content DPs receive accusative:

(39) a. Ich glaube ihr/*sie, dass Maria ein Genie war.
I believe her.DAT/ACC that Maria a genius was
'I believe her that Mary was a genius.'

b. Ich glaube die/#der Behauptung, dass Maria ein Genie war.
I believe the.ACC/DAT claim that Maria a genius was
'I believe the claim that Mary was a genius.'

(Djärv 2019: 235)

German sources

This patterns with dative case marking of optional ‘source’ arguments with other verbs, a construction generally available in German:

German sources

This patterns with dative case marking of optional ‘source’ arguments with other verbs, a construction generally available in German:

(40) Hans stahl Maria das Buch.
Hans stole Maria.DAT the.ACC book
‘Hans stole the book from Maria.’

(Schäfer 2008: 76)

German sources

This patterns with dative case marking of optional ‘source’ arguments with other verbs, a construction generally available in German:

(40) Hans stahl Maria das Buch.
Hans stole Maria.DAT the.ACC book
‘Hans stole the book from Maria.’

(Schäfer 2008: 76)

In Djärv’s (2019, 2021) analysis, (40) is assumed to be syntactically similar to *believe her*.

German sources

This patterns with dative case marking of optional ‘source’ arguments with other verbs, a construction generally available in German:

(40) Hans stahl Maria das Buch.
Hans stole Maria.DAT the.ACC book
‘Hans stole the book from Maria.’

(Schäfer 2008: 76)

In Djärv’s (2019, 2021) analysis, (40) is assumed to be syntactically similar to *believe her*.

→ The object DP of *believe* is introduced by an applicative head that introduces a *source* argument.

Problem 1: Overgeneration

If an unselected functional head is introducing the source argument of *believe*, any CE predicate should permit embedded DPs but this is not so:

Problem 1: Overgeneration

If an unselected functional head is introducing the source argument of *believe*, any CE predicate should permit embedded DPs but this is not so:

(41) *I think Consuelo (that it's raining).

Problem 1: Overgeneration

If an unselected functional head is introducing the source argument of *believe*, any CE predicate should permit embedded DPs but this is not so:

(41) *I think Consuelo (that it's raining).

Think can embed other DPs, like 'special quantifiers', free relatives, and propositional anaphors: (Moltmann, 2013; Elliott, 2017)

Problem 1: Overgeneration

If an unselected functional head is introducing the source argument of *believe*, any CE predicate should permit embedded DPs but this is not so:

(41) *I think Consuelo (that it's raining).

Think can embed other DPs, like 'special quantifiers', free relatives, and propositional anaphors: (Moltmann, 2013; Elliott, 2017)

(42) a. Garnet thinks [something]$_{DP}$.
b. Garnet thinks [whatever her mother thinks]$_{DP}$.
c. Garnet thinks [that]$_{DP}$.

Problem 2: Cross-linguistic variation

In Estonian, *believe DP CP* is licit, but the DP receives partitive (direct object) case regardless of whether it is a content nominal or not:

(43) a. Ma usun Liisi/*Liisile/*Liisilt, et
I believe Liis.PART/ALL/ABL that
koroonaviirus on ohtlik.
coronavirus is dangerous
'I believe Liis that coronavirus is dangerous.'

b. Õpetaja usub valet/*valele/*valelt, (et ma
teacher believes lie.PART/ALL/ABL that I
haige olen).
sick am
'The teacher believes the lie (that I am sick).'

Problem 2: Cross-linguistic variation

This is different from the ablative case a source DP receives with a verb like *varastama* ‘steal’.

Problem 2: Cross-linguistic variation

This is different from the ablative case a source DP receives with a verb like *varastama* ‘steal’.

(44) Keegi varastas temalt raha.
someone stole 3SG.ABL money.ACC
‘Someone stole money from him.’

Problem 2: Cross-linguistic variation

This is different from the ablative case a source DP receives with a verb like *varastama* ‘steal’.

(44) Keegi varastas temalt raha.
someone stole 3SG.ABL money.ACC
‘Someone stole money from him.’

→ The two source constructions cannot be unified in every language.

Problem 2: Cross-linguistic variation

This is different from the ablative case a source DP receives with a verb like *varastama* ‘steal’.

(44) Keegi varastas temalt raha.
someone stole 3SG.ABL money.ACC
‘Someone stole money from him.’

→ The two source constructions cannot be unified in every language.

Cross-linguistic variation

However, case may still play a role. For example, Russian:

Cross-linguistic variation

However, case may still play a role. For example, Russian:

(45) a. Ja verju [tomu chto byli fal'sifikacii].
I believe that.DAT COMP were falsifications
'I believe that there were falsifications.'
(Presupposed: there was a claim that there were falsifications)

b. Ja verju [chto byli fal'sifikacii].
I believe COMP were falsifications
'I believe that there were falsifications.'
(No pre-existing claim necessary)

Tanya Bondarenko, p.c.

Cross-linguistic variation

However, case may still play a role. For example, Russian:

(45) a. Ja verju [tomu chto byli fal'sifikacii].
I believe that.DAT COMP were falsifications
'I believe that there were falsifications.'
(Presupposed: there was a claim that there were falsifications)

b. Ja verju [chto byli fal'sifikacii].
I believe COMP were falsifications
'I believe that there were falsifications.'
(No pre-existing claim necessary)

Tanya Bondarenko, p.c.

→ We cannot necessarily use cross-linguistic evidence in arguing for an English analysis.

Upshots

The proposal is that *believe* takes an evidential argument, even when this argument is not made overt.

Upshots

The proposal is that *believe* takes an evidential argument, even when this argument is not made overt.

This complex lexicalization is preferable to an alternative analysis where this argument is introduced by a functional head.

Upshots

The proposal is that *believe* takes an evidential argument, even when this argument is not made overt.

This complex lexicalization is preferable to an alternative analysis where this argument is introduced by a functional head.

- This predicts the construction to be more widely available than it is

Upshots

The proposal is that *believe* takes an evidential argument, even when this argument is not made overt.

This complex lexicalization is preferable to an alternative analysis where this argument is introduced by a functional head.

- This predicts the construction to be more widely available than it is
- The connection with the semantics of predicates which allow the construction is lost

Upshots

The proposal is that *believe* takes an evidential argument, even when this argument is not made overt.

This complex lexicalization is preferable to an alternative analysis where this argument is introduced by a functional head.

- This predicts the construction to be more widely available than it is
- The connection with the semantics of predicates which allow the construction is lost

This argument can also explain nuance in the semantic/pragmatic profile of *believe p* in comparison to superficially similar*think p*.

Looking ahead

Revisiting the main points

- Syntax follows the semantics: CE behavior of a predicate is predicted by its meaning.

Revisiting the main points

- Syntax follows the semantics: CE behavior of a predicate is predicted by its meaning.
- We cannot fully understand the semantic behavior of a word without examining it in a wide variety of contexts

Revisiting the main points

- Syntax follows the semantics: CE behavior of a predicate is predicted by its meaning.
- We cannot fully understand the semantic behavior of a word without examining it in a wide variety of contexts
- The behavior of CE predicates with non-clausal arguments bears much closer scrutiny, **and can inform our understanding of CE predicates more generally**

Revisiting the main points

- Syntax follows the semantics: CE behavior of a predicate is predicted by its meaning.
- We cannot fully understand the semantic behavior of a word without examining it in a wide variety of contexts
- The behavior of CE predicates with non-clausal arguments bears much closer scrutiny, **and can inform our understanding of CE predicates more generally**
- The role of selection in understanding CE predicates is relatively small; we can explain their behavior without resorting to such lexical stipulations

Why examine individual words?

Studying individual verbs under a microscope can sound navel-gazey.

Why examine individual words?

Studying individual verbs under a microscope can sound navel-gazey.

But! Identifying lexical semantic classes has been enormously successful in developing other syntactic generalizations

(e.g. argument structure, see Levin 1993 a.m.o.)

Why examine individual words?

Studying individual verbs under a microscope can sound navel-gazey.

But! Identifying lexical semantic classes has been enormously successful in developing other syntactic generalizations

(e.g. argument structure, see Levin 1993 a.m.o.)

→ This requires a considerable extent of 'in the weeds' work on lexical meaning.

Why examine individual words?

Studying individual verbs under a microscope can sound navel-gazey.

But! Identifying lexical semantic classes has been enormously successful in developing other syntactic generalizations

(e.g. argument structure, see Levin 1993 a.m.o.)

→ This requires a considerable extent of 'in the weeds' work on lexical meaning.

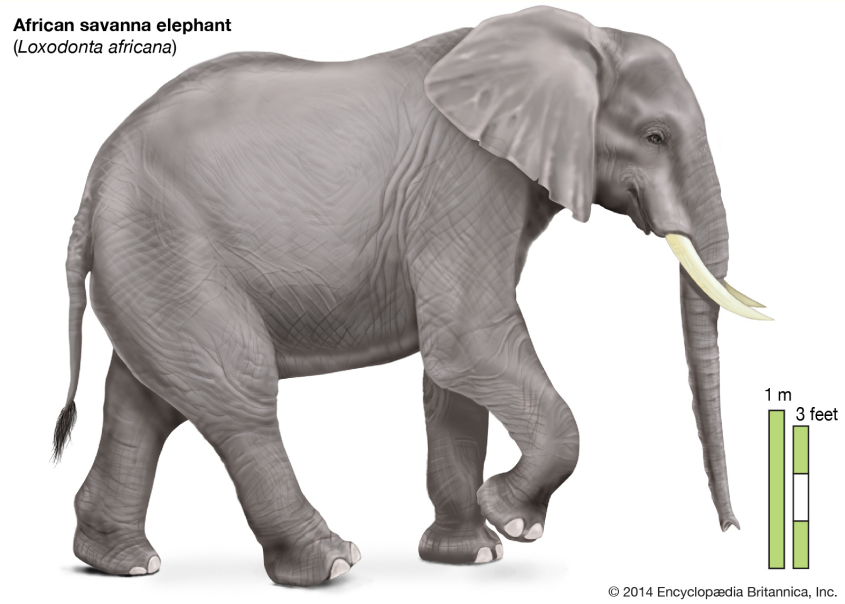
CE predicates occupy a unique niche, because they interact directly with the *meanings of clauses*, and thus can be illuminating for clausal semantics as well.

The elephant problem

There is a famous story in which a group of blind men encounter this beast:

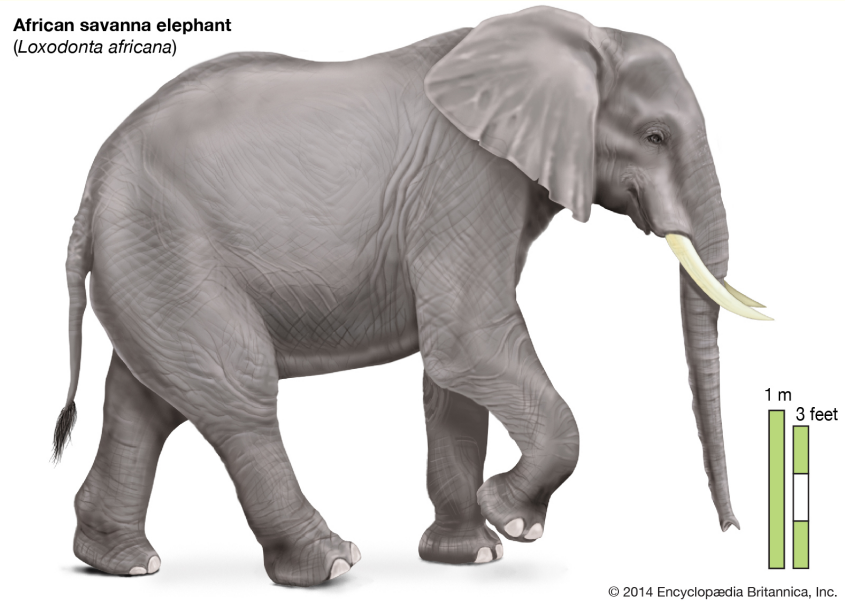
The elephant problem

There is a famous story in which a group of blind men encounter this beast:



The elephant problem

There is a famous story in which a group of blind men encounter this beast:



The men each examine a different part of the creature, and come to wildly different conclusions about its nature.

The elephant problem

In order to fully understand CE predicates, we need to look at their behavior in **the widest possible range** of linguistic environments.

The elephant problem

In order to fully understand CE predicates, we need to look at their behavior in **the widest possible range** of linguistic environments.

→ It would be difficult to detect evidential restrictions on *believe* without examining its nominal-embedding use.

The elephant problem

In order to fully understand CE predicates, we need to look at their behavior in **the widest possible range** of linguistic environments.

- → It would be difficult to detect evidential restrictions on *believe* without examining its nominal-embedding use.
- → Linguistic operators like negation above CE predicates affect their embedding behavior (Mayr, 2019; Roberts, To appear)

The cross-linguistic picture

An ultimate goal: Understanding what is responsible for variation, and lack of variation, in CE predicates across languages.

The cross-linguistic picture

An ultimate goal: Understanding what is responsible for variation, and lack of variation, in CE predicates across languages.

Most languages have hundreds if not thousands of CE predicates, so identifying semantic classes is a necessity for tractability of the problem.

The cross-linguistic picture

An ultimate goal: Understanding what is responsible for variation, and lack of variation, in CE predicates across languages.

Most languages have hundreds if not thousands of CE predicates, so identifying semantic classes is a necessity for tractability of the problem.

Big data and large-scale internet studies can help! (White & Rawlins, 2016, 2020)

The cross-linguistic picture

An ultimate goal: Understanding what is responsible for variation, and lack of variation, in CE predicates across languages.

Most languages have hundreds if not thousands of CE predicates, so identifying semantic classes is a necessity for tractability of the problem.

Big data and large-scale internet studies can help! (White & Rawlins, 2016, 2020)

CE predicates have only been examined systematically in a very small number of languages, a gap which needs to be filled (this is changing!)

The cross-linguistic picture

An ultimate goal: Understanding what is responsible for variation, and lack of variation, in CE predicates across languages.

Most languages have hundreds if not thousands of CE predicates, so identifying semantic classes is a necessity for tractability of the problem.

Big data and large-scale internet studies can help! (White & Rawlins, 2016, 2020)

CE predicates have only been examined systematically in a very small number of languages, a gap which needs to be filled (this is changing!)

What does this mean for syntax?

Finally, linguists have long distinguished between syntactic and semantic well-formedness:

What does this mean for syntax?

Finally, linguists have long distinguished between syntactic and semantic well-formedness:

(46) a. #Colorless green ideas sleep furiously.
b. *Furiously sleep ideas green colorless.

(Chomsky, 1957)

What does this mean for syntax?

Finally, linguists have long distinguished between syntactic and semantic well-formedness:

(46) a. #Colorless green ideas sleep furiously.
b. *Furiously sleep ideas green colorless.

(Chomsky, 1957)

It is not at all clear that introspective judgments are systematically similar to this difference (see Abrusán 2019 and citations within)

What does this mean for syntax?

Finally, linguists have long distinguished between syntactic and semantic well-formedness:

(46) a. #Colorless green ideas sleep furiously.
b. *Furiously sleep ideas green colorless.

(Chomsky, 1957)

It is not at all clear that introspective judgments are systematically similar to this difference (see Abrusán 2019 and citations within)

If we don't need selection to account for clausal embedding behavior...

What does this mean for syntax?

Finally, linguists have long distinguished between syntactic and semantic well-formedness:

(46) a. #Colorless green ideas sleep furiously.
b. *Furiously sleep ideas green colorless.

(Chomsky, 1957)

It is not at all clear that introspective judgments are systematically similar to this difference (see Abrusán 2019 and citations within)

If we don't need selection to account for clausal embedding behavior...

Could we reduce other questions of grammaticality to semantics or pragmatics?

Thank you/Aitäh!

Particular thanks to members of the committee: Pranav Anand, Donka Farkas, Jim McCloskey, and Floris Roelofsen, as well as eight anonymous Estonian consultants

References

Abrusán, Márta. 2019. Semantic anomaly, pragmatic infelicity, and ungrammaticality. Annual Review of Linguistics 5(1).

Bolinger, Dwight. 1968. Aspects of Language. New York: Harcourt, Brace, and World.

Cattell, Raymond. 1978. On the source of interrogative adverbs. Language 54. 61–77.

Chomsky, Noam. 1957. Syntactic Structures. Berlin: Mouton.

Ciardelli, Ivano, Jeroen Groenendijk & Floris Roelofsen. 2013. Inquisitive semantics: A new notion of meaning. Language and Linguistics Compass 7(9). 459–476.

Djärv, Kajsa. 2019. Factive and assertive attitude reports: University of Pennsylvania dissertation.

Djärv, Kajsa. 2021. Knowing and believing things: what DP-complements can tell us about the argument structure and composition of (factive) attitudes. Ms., University of Konstanz.

Elliott, Patrick D. 2017. Elements of clausal embedding: University College London dissertation.

von Fintel, Kai. 2001. Counterfactuals in a dynamic context. Current Studies in Linguistics 36.

Gajewski, Jon. 2002. L-analyticity and natural language. Ms., MIT.

Ginzburg, Jonathan. 1995. Resolving questions. Linguistics and Philosophy 18. 459–527(Part I) and 567–609 (Part II).

Grimshaw, Jane. 1979. Complement selection and the lexicon. Linguistic Inquiry 10(2). 279–326.

Groenendijk, Jeroen & Martin Stokhof. 1984. Studies on the Semantics of Questions and the Pragmatics of Answers: University of Amsterdam dissertation.

Hacquard, Valentine. 2006. Aspects of modality: Massachusetts Institute of Technology dissertation.

Hacquard, Valentine. 2010. On the event relativity of modal auxiliaries. Natural Language Semantics 18. 79–114.

Hegarty, Michael. 1990. On adjunct extraction from complements. In L.L.S. Cheng & H. Demirdash (eds.), MIT Working Papers in Linguistics, vol. 13, 101–124.

Heim, Irene. 1992. Presupposition projection and the semantics of attitude verbs. Journal of Semantics 9. 183–221.

Heim, Irene. 1994. Interrogative semantics and Karttunen's semantics for know. In R. Buchalla & A. Mittwoch (eds.), The Ninth

Annual Conference and the Workshop on Discourse of the Israel Association for Theoretical Linguistics, Academon, Jerusalem.

Karttunen, Lauri. 1977. Syntax and semantics of questions. Linguistics and Philosophy 1(1). 3–44.

Kastner, Itamar. 2015. Factivity mirrors interpretation: The selectional requirements of presuppositional verbs. Lingua 164. 156–188.

King, Jeffrey C. 2002. Designating propositions. The Philosophical Review 111. 341–371.

Lahiri, Utpal. 2002. Questions and Answers in Embedded Contexts. Oxford Studies in Theoretical Linguistics.

Levin, Beth. 1993. English Verb Classes and Alternations. University of Chicago Press.

Mayr, Clemens. 2019. Triviality and interrogative embedding: context-sensitivity, factivity, and neg-raising. Natural Language Semantics 27(3). 227–278.

Moltmann, Friederike. 2013. Abstract Objects and the Semantics of Natural Language. Oxford: Oxford University Press.

Pesetsky, David. 1982. Paths and Categories: Massachusetts Institute of Technology dissertation.

Pesetsky, David. 1991. Zero syntax: vol. 2: Infinitives. Ms., MIT.

Pustejovsky, James. 1995. The Generative Lexicon. Cambridge, MA: MIT Press.

Roberts, Tom. To appear. How to build a factive predicate. In Wataru Uegaki & Floris Roelofsen (eds.), The interface between logic and grammar in the domain of clausal comp .

Schäfer, Florian. 2008. The Syntax of (Anti-)Causatives: External arguments in change-of-state c John Benjamins.

Stephenson, Tamina. 2007. Judge dependence, epistemic modals, and predicates of personal taste. Linguistics and Philosophy 30(4). 487–525.

Theiler, Nadine, Floris Roelofsen & Maria Aloni. 2018. A uniform semantics for declarative and interrogative complements. Journal of Semantics 35(3).

Uegaki, Wataru. 2016. Content nouns and the semantics of question-embedding. Journal of Semantics 33(4). 623–660.

Vendler, Zeno. 1972. Res Cogitans: An Essay in Rational Psychology. Cornell University Press. Ithaca, New York.

White, Aaron Steven & Kyle Rawlins. 2016. A computational model of s-selection. In Proceedings of SALT 26, 641–663.

White, Aaron Steven & Kyle Rawlins. 2020. Frequency, acceptability, and selection: A case study of clause-embedding. Glossa 5(1). 1–41.

Williams, Alexander. 2015. Arguments in Syntax and Semantics Key Topics in Syntax. Cambridge University Press.